

WHAT IS CLAIMED IS:

- 5 1. An apparatus for warming-up a fuel cell having means for returning an exhaust gas which returns the exhaust gas to the supply gas depending upon the warming-up conditions of the fuel cell at the time when the supply gas is supplied into the fuel cell and it is discharged as the exhaust gas after utilizing the supply gas in the fuel cell.
- 10 2. The apparatus for warming-up a fuel cell as claimed in Claim 1, wherein said means for returning the exhaust gas is controlled depending upon the temperature of the exhaust gas.
- 15 3. The apparatus for warming-up a fuel cell as claimed in Claim 1, having a compressor which discharges the exhaust gas from the fuel cell and which returns the exhaust gas to the supply gas.
- 20 4. The apparatus for warming-up a fuel cell as claimed in Claim 2, having a compressor which discharges the exhaust gas from the fuel cell and which returns the exhaust gas to the supply gas.
- 25 5. The apparatus for warming-up a fuel cell as claimed in Claim 3, having a pressure controller which controls the pressure of the exhaust gas from the fuel cell.
6. The apparatus for warming-up a fuel cell as claimed in Claim 4, having a pressure controller which controls the pressure of the exhaust gas from the fuel cell.
- 30 7. The apparatus for warming-up a fuel cell as claimed in Claim 5, wherein said pressure controller is controlled depending upon the temperature of the supply air.
8. The apparatus for warming-up a fuel cell as claimed in Claim 6, wherein said pressure controller is controlled depending upon the temperature of the supply air.
9. The apparatus for warming-up a fuel cell as claimed in Claim 7, wherein

said pressure controller is controlled by comparing the temperature of the supply gas with a target temperature of the supply gas.

10. The apparatus for warming-up a fuel cell as claimed in Claim 8, wherein
5 said pressure controller is controlled by comparing the temperature of the supply gas with a target temperature of the supply gas.

11. The apparatus for warming-up a fuel cell as claimed in Claim 1, wherein
said supply gas is air which is supplied to an oxygen pole side of the fuel cell, and said
10 means for returning the exhaust gas is controlled depending upon the amount of oxygen in the air supplied into the oxygen pole of the fuel cell.

12. The apparatus for warming-up a fuel cell as claimed in Claim 11, when
the amount of oxygen is decreased due to the power generation of the fuel cell, the
15 amount of the exhaust gas to be returned being decreased by the means for returning the exhaust gas.

13. An apparatus for warming-up a fuel cell having a compressor, which
supply a supply gas into the fuel cell and which discharge the supply gas as an exhaust
20 gas after being utilized in fuel cell, characterized in that the gas is heated by heat generated by the adiabatic compression of the compressor, the heated gas is supplied into the fuel cell to warm-up the fuel cell, and the gas discharged from the fuel cell is returned to the compressor to form a circulation cycle.

14. The apparatus for warming-up a fuel cell as claimed in Claim 13, wherein
25 said circulation cycle possesses a heat exchanger between the gas before heated by the compressor and the gas after heated by the compressor, and the gas heated by the heat exchanger is supplied to the fuel cell.

15. The apparatus for warming-up a fuel cell as claimed in Claim 13, wherein
30 said apparatus judges whether or not the warming-up of the fuel cell has been completed, and the power generation of said fuel cell is started after the warming-up is judge to be completed.

16. The apparatus for warming-up a fuel cell as claimed in Claim 14, wherein said apparatus judges whether or not the warming-up of the fuel cell has been completed, and the power generation is started after the warming-up is judge to be completed.
17. The apparatus for warming-up a fuel cell as claimed in Claim 15, wherein the judgment of the completion of the warming-up is on the basis of the temperature of the exhaust gas discharged form the fuel cell.
18. The apparatus for warming-up a fuel cell as claimed in Claim 16, wherein the judgment of the completion of the warming-up is on the basis of the temperature of the exhaust gas discharged form the fuel cell.
19. The apparatus for warming-up a fuel cell as claimed in Claim 13, wherein said supply gas is air which is supplied to an oxygen pole side of the fuel cell, when the amount of oxygen in said circulation cycle is decreased due to the power generation of the fuel cell, the fresh air is taken to replenish oxygen.

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